IFW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: R. DANDALA et al.	Confirmation No.: 6953
Application No: 10/634,978	Group Art Unit: 1614
Filing Date: August 4, 2003	Examiner:
For: NOVEL CRYSTALLINE FORM OF CEFDINIR	Attorney Docket No.: 2003-015

DECLARATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

We, Ramesh Dandala and Meenakshisunderam Sivakumaran, do declare that:

1. We are the inventors of the above-identified application. We submit the following declaration in order to provoke an interference with U.S. Application No. 10/405,648.

2. I, Ramesh Dandala, am a citizen of India and currently reside at 403, Janapriya Pramila Enclave, Uma Nagar, Kundanbagh, Begumpet, Hyderabad, India 500 016. I am currently employed by Aurobindo Pharma Limited, ("Aurobindo"), the assignee of the above-identified application.

3. I, Meenakshisunderam Sivakumaran, am a citizen of India and currently reside at D-1 Hidden Treasure Apts, Near Ayappa Swami Temple Lane, Somajiguda, Hyderabad, India 500 082. I am also currently employed by Aurobindo.

4. Attached hereto is Exhibit A, which reports and describes work done at Aurobindo, in India, by us or under our direction and control in connection with this application. We have reviewed the document of Exhibit A. Although the dates have been redacted, the data used in the Exhibit were gathered and analyzed before April 29, 2002.

5. Exhibit A is a copy of the relevant pages of a laboratory notebook used at Aurobindo describing the preparation of cefdinir. The notebook describes the preparation of Cefdinir Crystal B and the results of various tests on Crystal B, all of which were conducted before April 29, 2002. The remaining tests were also conducted by us or under our direction.

6. Attached hereto as Exhibit B is a copy of an HPLC chromatogram analysis, HPLC laboratory notebook, and HPLC log book for the cefdinir Crystal B prepared according to the procedures in Exhibit A. Although the dates are redacted, the HPLC analyses were conducted before April 29, 2002.

7. Attached hereto as Exhibit C is a copy of an Infrared Spectrum analysis for the cefdinir Crystal B prepared according to the procedures in Exhibit A. Although the date is redacted, the IR analysis were conducted before April 29, 2002. This IR spectrum is shown in FIG. 3 of the above-identified application, and the peaks are recited in claim 2.

8. Attached hereto as Exhibit D is a copy of a Specific Optical Rotation analysis for the cefdinir Crystal B prepared according to the procedures in Exhibit A. Although the date is redacted, the SOR analysis was conducted before April 29, 2002.

9. Attached hereto as Exhibit E are copies of Karl Fischer instrument logbooks which demonstrate an analysis of the moisture content of the cefdinir Crystal B prepared according to the procedures in Exhibit A. Although the dates are redacted, these analyses were conducted before April 29, 2002.

10. Claim 1 of U.S. Application No. 10/405,648 ("the '648 application") covers a particular crystalline form of cefdinir that is the same as the form covered by claims 1-3 of the above-identified application. The claims of the '648 patent are attached as Exhibit F.

11. In both applications, the crystalline form is described by reference to powder X-ray diffraction patterns. In the '648 application, the XRD data are represented by interplanar spacing (d), whereas in the above-identified application, the XRD data are defined by the diffraction angles (2θ). These are simply two ways of expressing the same results.

The conversion of diffraction angle into interplanar spacing is done by following the Bragg's equation as below:

$n\lambda = 2d\sin\theta$

where n represents 1

λ represents wavelength of the cathode used

d represents Interplanar spacing

θ (theta) represents diffraction angle

12. A comparison of the d-spacing values of the above-referenced application has been made to the corresponding values of the '648 application and is attached as Exhibit G. As can be seen from the comparison, the claims of the above-identified application cover the same crystalline form of cefdinir as the claims of the '648 application.

13. We further declare that all statements made herein of our knowledge are true and all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made may jeopardize the validity of any patent which issues from the above-identified application.

Date: Oct 23, 2004

Ramesh Dandala

Date: Oct 23, 2004

Meenakshisunderam Sivakumaran

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: R. DANDALA et al.	Confirmation No.:
Application No:	Group Art Unit:
Filing Date: Herewith	Examiner:
For: NOVEL CRYSTALLINE FORM OF CEFDINIR	Attorney Docket No.: 7893-12

REQUEST TO DECLARE AN INTERFERENCE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicants respectfully request that an interference be declared between the above-identified application ("the Dandala application") and U.S. Application No. 10/405,648 ("the '648 application") for one proposed count as set forth below. In support of this request, Applicants submit herewith a declaration and exhibits prepared for parent application of no. 10/634,978 ("the '978 application"), which establish a date of invention prior to the date of constructive reduction to practice of the '648 application.

Applicants propose the count as: A crystalline form of cefdinir, the X-ray diffraction spectrum of which shows peaks at the interplanar spacing (d) of: 15.16 or 15.24; 7.55 or 7.51; 5.50 or 5.48; 4.77 or 4.76; 4.19 or 4.17; 3.99; 3.64; and 3.40 or 3.39 Å.

The following claim chart compares the claims in each application corresponding to the proposed count.

Chart A. Proposed Count and Corresponding Claims in the '978 and '648 Applications

Count	A crystalline form of cefdinir,	the X-ray diffraction spectrum of which shows peaks	at the interplanar spacing (d) of: 15.16 or 15.24; 7.55 or 7.51; 5.50 or 5.48; 4.77 or 4.76; 4.19 or 4.17; 3.99; 3.64; and 3.40 or 3.39 Å.
Dandala Application			
Claim 4	A crystalline form of cefdinir,	the X-ray diffraction spectrum of which shows peaks	at the interplanar spacing (d) of about 15.16, 7.55, 5.50, 4.77, 4.19, 3.99, 3.64, and 3.40 Å.

<table>
<tr><td>Claim 1</td><td>A crystalline 7b-[(Z)-2-(2-amino-4-thiazolyl)-2-hydroxyiminoacetamido]-3-vinyl-3-cephem-4-carboxylic acid (cefdinir crystal B),</td><td>the X-ray diffraction spectrum of which shows peaks</td><td>at the diffraction angles of about 5.8 ± 0.2, 11.7 ± 0.2, 16.1 ± 0.2, 18.6 ± 0.2, 21.2 ± 0.2, 22.3 ± 0.2, 24.4 ± 0.2 and 26.2 ± 0.2 two theta degrees.</td></tr>
<tr><td><u>'648 Application</u>
Claim 1</td><td>A crystalline form of cefdinir,</td><td>the X-ray diffraction spectrum of which</td><td>has the following characteristics:
Filter: Ni
Anticathode: Cu Kα Current: 40 mA
Voltage 40 kV Relative
<u>d(Å)</u> <u>Intensity</u>
15.24 30
11.3 18
10.92 18
7.51 100
5.66 24
5.48 55
4.91 20
4.76 96
4.55 44
4.23 71
4.17 85
3.99 74
3.74 18
3.64 78
3.53 24
3.46 62
3.39 85
3.26 14
3.17 21
3.08 37
2.96 10
2.89 23
2.82 69
2.81 42
2.63 13
2.57 21
2.54 18
2.39 8
2.31 17
1.99 25
1.97 10</td></tr>
</table>

As Chart A shows, claim 4 of the present application corresponds exactly to the proposed count. Claim 1 of the present application, which claims the same crystalline cefdinir compound as claimed in claim 4 but describes the compound in terms of a different X-ray diffraction (XRD) parameter, also corresponds to the proposed count. Claims 5-6 and 2-3, which depend from claim 4 and claim 1, respectively, also relate to the same crystalline cefdinir compound as claimed in claims 4 and 1. Hence, dependent claims 5-6 and 2-3 cover the same subject matter as the proposed count, and these claims also correspond to the proposed count. Claim 7 simply lists the X-ray diffraction characteristics recited in claims 1 and 4, and therefore also correspond to the proposed count as it relates to the same crystalline cefdinir compound.

Claim 1 of the '648 application corresponds to the proposed count. This claim, describing the cefdinir crystal compound in terms of the interplanar spacing (d) values of the XRD spectrum, lists a number of interplanar spacing values that correspond to the XRD spectrum shown in the '648 application. The relative intensities of the XRD spectrum show, however, that eight of the highest peaks in the spectrum are represented by the interplanar spacing values of (in Å): 15.24 (with relative intensity 30); 7.51 (with relative intensity 100); 5.48 (with relative intensity 55); 4.76 (with relative intensity 96); 4.17 (with relative intensity 85); 3.99 (with relative intensity 74); 3.64 (with relative intensity 78); and 3.39 (with relative intensity 85). Since the crystalline cefdinir in claim 1 of the '648 application shows peaks at the interplanar spacing values recited in the proposed count, claim 1 of the '648 application corresponds to the proposed count.

Claims 8-10 of the present application, directed to the crystalline cefdinir containing greater than 5.5% water content by weight, as opposed to the water content of about 0.8% of cefdinir crystal A, do *not* correspond to the proposed count because this claim defines a compound having increased stability than cefdinir crystal A. Claims 11-12 directed to a pharmaceutical composition and process claims 13-22 also do *not* correspond to the proposed count. Similarly, process claims 2-3 of the '648 application do *not* correspond to the proposed count.

The following Chart B summarizes which claims in the Dandala and '648 applications correspond to the proposed count.

Chart B. Correspondence of Claims to the Proposed Count

Claim	Subject Matter	Correspondence to Proposed Count
Dandala Application		
Claims 1-7	Crystalline cefdinir compound having particular X-ray diffraction characteristics described in diffraction angle (2θ) and/or interplanar spacing values (d)	Correspond
Claims 8-11	Crystalline cefdinir compound having increased storage stability	Do not correspond
Claims 12-13	Pharmaceutical composition comprising cefdinir crystal B	Do not correspond
Claims 14-23	Process for preparing cefdinir crystal B	Do not correspond
'648 Application		
Claim 1	Crystalline cefdinir compound having particular X-ray diffraction characteristics described in interplanar spacing values (d)	Correspond
Claims 2-3	Process for preparing cefdinir crystal B	Do not correspond

Chart A also shows why claims 1-7 of the present application and claim 1 of the '648 application interfere within the meaning of 37 C.F.R. § 41.203(a). In particular, because the crystalline cefdinir of claim 4 in the present application shows peaks at substantially the same interplanar spacing values as the crystalline cefdinir of claim 1 in the '648 application, with both applications showing the highest peak at the interplanar spacing value of about 7.51-7.55 Å, the crystalline cefdinir of claim 4, if prior art, would have anticipated or rendered obvious the subject matter of claim 1 in the '648 application, and *vice versa*. Further, since claims 1 and 4 of the present application claim the same crystalline cefdinir compound, with the only difference between the two claims being the XRD parameter recited in each claim, claim 1 of the present application also interferes with claim 1 of the '648 application within the meaning of 37 C.F.R. § 41.203(a). Claims 5-6 and 2-3 of the present application, which depend from claims 4 and 1 and therefore cover the same subject matter, also interfere with claim 1 of the '648 application. Likewise, claim 7 of the present application, directed to the crystalline cefdinir whose characteristics are recited in claims 1-6 also cover the same subject matter as claimed in claims 1-6 and therefore interfere with claim 1 of the '648 application.

Applicants also respectfully submit that they are entitled to a priority date that is earlier than both the U.S. filing date and the date of the priority application for the '648

application. The current date for a constructive reduction to practice for the '648 application is April 3, 2003, while, if properly awarded, the earliest constructive reduction to practice for the '648 application would be deemed to be April, 29, 2002, the filing date of its Italian priority application.

As established by the declaration and exhibits submitted herewith, the date of the invention for the present application is prior to April 29, 2002. If unrebutted, this evidence would enable Dandala et al. to prevail in an interference with the '648 application.

The present application is entitled to a constructive reduction to practice for its parent '978 application since the '978 application also supports the present claims. In particular, the X-ray diffraction characteristics of the presently claimed cefdinir crystal B are disclosed in Table-1 and Figure 1 of the '978 application. Although Table-1 of the '978 application shows only the diffraction angle (2θ), the relationship between the diffraction angle and interplanar spacing (d) is well known in the art and is described by the Bragg's equation: $n\lambda = 2d\sin\theta$, where $n = 1$;

λ = wavelength of the cathode used = wavelength of copper Kα = 1.54 Å;
d = interplanar spacing; and
θ = diffraction angle.

Hence, $d = n\lambda / 2\sin\theta = 1.54 / (2\sin\theta)$. Thus, simple calculations can be used to convert the data in Table-1 to interplanar spacings. Thus, the interplanar spacing values for the cefdinir crystal B disclosed in the '978 application would be clearly understood and obvious to a person skilled in the art, as such a skilled artisan is familiar with the Bragg's equation, and the specification provides the necessary details, such as the cathode used (for example at p. 5, lines 8-12 (providing that a "copper target X-ray tube" is used)), of the variables in the equation so that these calculations can be made. Accordingly, interplanar spacing values corresponding to each diffraction angle listed in Table-1 of the '978 application can easily be calculated as follows:

2θ values for Cefdinir Crystal B	**θ values for Cefdinir Crystal B**	**Calculation of $d = n\lambda / 2\sin\theta$**
5.8	2.9	15.16
7.7	3.85	11.38
8.0	4.0	11.02
11.7	5.85	7.55
15.6	7.8	5.68
16.1	8.05	5.50
18.6	9.3	4.77
19.4	9.7	4.58
21.0	10.5	4.24

21.2	10.6	4.19
22.3	11.15	3.99
24.4	12.2	3.64
25.6	12.8	3.47

The Chart C summarizes where the '978 application provides a constructive reduction to practice for each claim in the present application, especially for each claim within the scope of the interfering subject matter.

Chart C. Support in the '978 Application for Claims in the Dandala Application

Claim	Disclosure in the '978 Application
Claims 1, 4, 7	pp. 5-6; Table 1; Figure 1
Claims 2, 5	pp. 5-6; Table 1; Figure 1 p. 8, lines 1-3; Figure 3
Claims 3, 6	pp. 5-6; Table 1; Figure 1 p. 5, lines 2-3 p. 3, lines 17-19
Claim 8-10	p. 8, line 11 to p. 9, line 8; Table 3 p. 3, lines 17-23 p. 5, lines 2-3
Claims 11-12	p. 8, lines 11-13
Claims 13-22	p. 9, line 10 to p. 11, line 9 Examples 1-3

The present application is also entitled to a constructive reduction to practice for Indian Patent Application No. 440/MAS/2003 ("the Indian application"), filed June 2, 2003. The disclosure in the Indian application is similar to that in the '978 application, and describes the same X-ray diffraction characteristics of the present cefdinir crystal B as disclosed in the '978 application. In particular, the following chart, Chart D, summarizes where the Indian application provides a constructive reduction to practice for each claim in the present application, especially for each claim within the scope of the interfering subject matter.

Chart D. Support in the Indian Application (440/MAS/2003) for Claims in the Dandala Application

Claim	Disclosure in the Indian Application
Claims 1, 4, 7	p. 3; Table 1; Figure 1
Claims 2, 5	p. 3; Table 1; Figure 1

	p. 4; Figure 3
Claims 3, 6	p. 3; Table 1; Figure 1 p. 3, lines 4-5 p. 1, lines 4-6 from the end
Claim 8-10	p. 4; Table 3 p. 1, last paragraph p. 3, lines 4-5
Claims 11-12	p. 4
Claims 13-22	p. 5 Examples 1-3

Furthermore, the declaration submitted herewith shows inventive activity prior to the filing date of the Indian application. The laboratory notebook and analyses submitted as Exhibits A-E show the preparation and properties of the crystalline cefdinir as presently claimed in claims 1-7 of the present application, in claims 1-3 of the '978 application, and in claims 1-4 of the Indian application. Thus, Exhibits A-E clearly establish the actual reduction to practice by Applicants of the cefdinir crystal claimed in this and the '978 and Indian applications. Although the dates have been redacted from these exhibits, the notebook and the analyses were prepared and performed before April 29, 2002, as confirmed in the declaration. Since all the subject matter claimed in the present application is disclosed in the '978 and Indian applications, the present application is entitled to the same priority date as the '978 and Indian applications. Therefore, the declaration and the supporting exhibits demonstrate that, unless rebutted, Applicants will prevail on priority, and Applicants are *prima facie* entitled to a judgment relative to the '648 application.

In addition, Applicants wish to notify the Examiner of additional possibly interfering subject matter disclosed in International Application No. WO 2004/085443, published October 7, 2004, which claims priority to Japanese Patent Application No. 2003-081273 filed March 24, 2003. This application also claims the same cefdinir crystal structure as the '648 application. To Applicants' knowledge, no U.S. counterpart application of this PCT application has been filed and none could be located from public PAIR or elsewhere. If necessary, the Examiner should consider adding that party's US counterpart application to the present requested interference should that party file a US application.

It is believed that the present claims are patentable because they define a totally new crystalline compound that provides unexpected advantages in purity and properties over the closest prior art, which is believed to be the existing cefdinir crystal A.

In view of the foregoing, Applicants respectfully request that an interference be declared at least between claims 1-7 of the present application and claim 1 of the '648 application for the count proposed herein.

Respectfully submitted,

Date 29 October 2004

Scott H. Blackman (Reg. No. 34,088)
For: Allan A. Fanucci (Reg. No. 30,256)

WINSTON & STRAWN LLP
CUSTOMER NO. 28765
(212) 294-3311